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EXAMINER

ALEJANDRO, RAYMOND

ART UNIT	PAPER NUMBER
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1745

MAIL DATE	DELIVERY MODE
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08/16/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/759,102	Applicant(s) MIWA, KAZUYA	
	Examiner Raymond Alejandro	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01/20/04 & 04/29/04.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01/20/04 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>01/20/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 01/20/04 was considered by the examiner.

Oath/Declaration

3. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because:

It does not identify the mailing address of each inventor. A mailing address is an address at which an inventor customarily receives his or her mail and may be either a home or business address. The mailing address should include the ZIP Code designation. The mailing address may be provided in an application data sheet or a supplemental oath or declaration. See 37 CFR 1.63(c) and 37 CFR 1.76.

Drawings

4. Figure 4 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted

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by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

5. The preliminary amendments filed 01/20/04 and 04/29/04 do not introduce new matter into the disclosure.

6. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

7. The use of the trademark Nafion (page 9, line 18) has been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

8. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

9. The disclosure is objected to because of the following informalities: *Brief Description of the Drawings* in the specification does not include a description of Figure 4. Appropriate correction is required.

Claim Objections

10. Claim 11 is objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim cannot depend from another multiple dependent claim (i.e. claim 8). See MPEP § 608.01(n). Accordingly, the claim 11 has not been further treated on the merits.

Claim Rejections - 35 USC § 112

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

12. Claims 1-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

13. Claim 1 recites the limitation "*the exhaust*" in line 5. There is insufficient antecedent basis for this limitation in the claim.

14. Claim 2 recites the limitations "*the membrane separation method*" in lines 2-3, and "*the pressure swing adsorption method*" in lines 3-4. There is insufficient antecedent basis for this limitation in the claim.

15. Claims 3-4 recite the limitations "*the pressure swing adsorption method*" in line 8 (claim 3) and in line 5 (claim 4). There is insufficient antecedent basis for this limitation in the claim.

16. Claim 4 recites the limitations "*the pressure swing adsorption method*" in line 8 (claim 3) and in line 5 (claim 4). There is insufficient antecedent basis for this limitation in the claim.

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17. Claim 5 recites the limitations "*the membrane separator*" in line 2. There is insufficient antecedent basis for this limitation in the claim. Claim 5 also depends upon claim 2 which does not recite the foregoing limitation.

18. Claim 5 recites the limitations "*the membrane separation method*" in line 2. There is insufficient antecedent basis for this limitation in the claim. Claim 5 also depends upon claims 3-4 which do not recite the foregoing limitation.

19. Claim 6 recites the limitations "*the adsorber*" in line 2. There is insufficient antecedent basis for this limitation in the claim. Claim 6 also depends from claim 2 which does not recite the foregoing limitation.

20. Claim 7 recites the limitation "*the offgas*" in lines 4 and 5 (two occurrences). There is insufficient antecedent basis for this limitation in the claim.

21. Claim 8 recites the limitation "*the offgas*" in lines 4 and 5 (two occurrences). There is insufficient antecedent basis for this limitation in the claim.

22. Claim 8 recites the limitation "*the heater*" in line 2 and "*said heater*" in line 3. There is insufficient antecedent basis for this limitation in the claim.

23. Claims 1, 2, 3, 4, 5, 6, 7, 8 and 10-11 are indefinite because they recite or include multiple recitations of either the terms "*by use*", "*for use*", "*that uses*", "*uses when*", "*by using*", or the language "*the membrane separation method*" and "*the pressure swing adsorption method*" in conjunction with the limitation "*a hydrogen supply unit (an apparatus itself)*". It appears that all the preceding claims embrace or overlap two (2) different statutory classes of invention or are drafted so as to set forth the statutory classes of invention in the alternative only (i.e. "*the hydrogen supply unit (an apparatus)*", and either "*the method for separation/adsorption*" or "*the*

method of using certain features”. Currently, the claimed subject matter appears to be ambiguous. Further clarification is required. (See MPEP 2173.05(p) *Claim Directed to Product-By- Process or Product and Process: II. PRODUCT AND PROCESS IN THE SAME CLAIM*).

Applicant is advised to properly address this item, otherwise it might raise further issues under 35 USC 101 as embracing two different statutory classes of invention. Applicant’s cooperation to clarify or correct the above issues is requisitioned.

24. Claims 7-8 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: the specific structural interrelationship of the features recited in claims 7-8 is/are immediately unclear as the present claims combine structural elements with diverse functional, use or steps limitations, thereby obscuring and making it difficult to ascertain the intended scope of the claimed invention.

Claim Rejections - 35 USC § 102

25. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

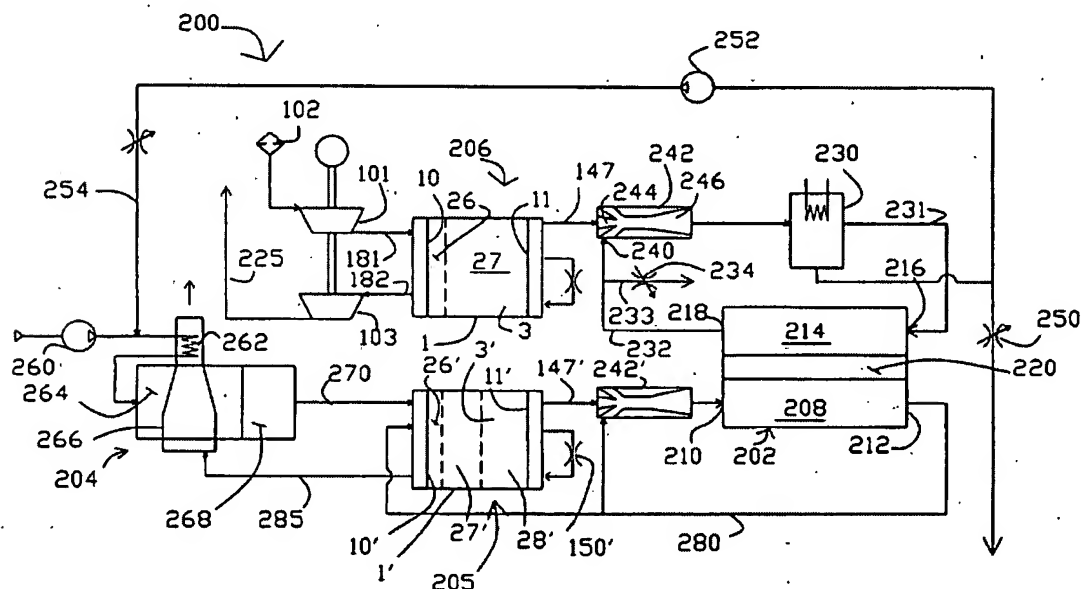
26. Claims 1-4 and 6-10 are rejected under 35 U.S.C. 102(e) as being anticipated by Keefer et al 2006/0182680.

The objective of the present invention is directed to a hydrogen supply unit wherein the disclosed inventive concept comprises the specific purification means.

With regard to claim 1:

Keefer et al disclose a system and process for providing hydrogen to fuel cells (TITLE/Abstract) including a steam reforming fuel processor 204, a fuel cell 202, and a hydrogen purification PSA system 205 (*PSA stands for pressure swing adsorption*) (P0096/CLAIM 18). Reforming is used to generate hydrogen (P0004, 0103), and the fuel cell provides a source of electrical current (P0003). It is evident from **Figure 6** below that the hydrogen purification PSA system 205 is both upstream and downstream of the fuel cell 202 (See FIGURE 6). *Thus, it also receives the anode exhaust of the fuel cell.* **FIGURES 7-9** also depict other fuel cell power plant systems. Keefer et al disclose substitution or combined use of any type of hydrogen purification unit such as gas separation devices including other types of adsorption modules or gas membrane separation systems (P0095 & 0005).

FIG. 6



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With regard to claims 2-4:

Keefer et al disclose a hydrogen purification PSA system 205 (*PSA stands for pressure swing adsorption*) (P0096/CLAIM 18). Keefer et al further teach substitution or combined use of any type of hydrogen purification unit such as gas separation devices including other types of adsorption modules or gas membrane separation systems (P0095 & 0005). Ejector 242' (P0101) or even the conduit line (P0101) itself can act as the pressurizer.

With regard to claim 6:

The hydrogen purification PSA system 205 comprises plural zones and adsorbent materials for hydrogen purification (P0100 & 0103).

With regard to claims 7-8:

Keefer et al disclose using a steam reforming fuel processor 204 (P0096/CLAIM 18); or alternative fuel processors such as an autothermal or partial oxidation reactors for processing of hydrocarbon fuels to generate hydrogen rich reformat (P0103). Reforming is used to generate hydrogen (P0004, 0103), and the fuel cell provides a source of electrical current (P0003). *Steam and autothermal reforming encompass the use or transfer of heat.*

With regard to claims 9-10:

Keefer et al discuss purification and storage of hydrogen either as compressed gas or cryogenic liquid; and distribution of said hydrogen to a fuel cell vehicle (P0004).

Thus, the present claims are anticipated.

Claim Rejections - 35 USC § 103

27. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

28. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

29. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Keefer et al 2006/0182680 as applied to claims 2-4 above, and further in view of Carr et al 4233132.

Keefer et al is applied, argued and incorporated herein the reasons expressed above. However, the preceding prior art reference does not expressly disclose the specific membrane separator.

Carr et al disclose an apparatus for producing (purifying) hydrogen comprising electrodes being separated by a material and means for imposing electrical potential across the electrode for generating hydrogen (ABSTRACT/CLAIM 13).

With these teaching, it would have been obvious to a person of ordinary skill in the pertinent art at the time the invention was made to incorporate the specific membrane separator of Carr et al into the fuel cell system of Keefer et al as Carr et al discloses that it is known to use

the above hydrogen membrane separator for continuously producing a suitable quantity of hydrogen which is separately collected and usable in gaseous form. Thus, Carr et al's hydrogen purification/generating apparatus assists in the generation, production or purification of hydrogen.

30. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Keefer et al 2006/0182680 as applied to claims 3-4 and 8 above, and further in view of Applicant's Admission of Prior Art (heretofore the AAPA) (*Applicant's specification, page 2, lines 1-8*).

Keefer et al is applied, argued and incorporated herein the reasons expressed above.

As to claim 11:

Keefer et al discuss purification and storage of hydrogen either as compressed gas or cryogenic liquid; and distribution of said hydrogen to a fuel cell vehicle (P0004). Ejector 242' (P0101) or even any of the conduit lines (P0101) itself can act as the pressurizer. *Keefer et al readily envisions hydrogen storage for use in a fuel cell vehicle.*

However, the preceding prior art reference does not expressly disclose the specific first tank for storing hydrogen.

The AAPA discloses that it is known to include a storage tank 35 for storing the hydrogen purified by the purifier 33 and the hydrogen which has not been used in the fuel cell (*Applicant's specification, page 2, lines 1-8*).

With these teaching, it would have been obvious to a person of ordinary skill in the pertinent art at the time the invention was made to incorporate the specific first tank for storing hydrogen of the AAPA into the fuel cell system of Keefer et al as the AAPA discloses that such

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a storage tank is useful for storing the hydrogen purified by the purifier and the hydrogen which has not been used in the fuel cell. Thus, the storing tank provides the benefit of storing hydrogen.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Raymond Alejandro
Primary Examiner
Art Unit 1745



RAYMOND ALEJANDRO
PRIMARY EXAMINER